



Cedar Valley Gems

Cedar Valley Rocks & Minerals Society
Cedar Rapids, Iowa

CEDAR VALLEY GEMS

MARCH 2017

VOL. 43, ISSUE 3

Ray Anderson, Editor: rockdoc.anderson@gmail.com

Next CVRMS Meeting Tues. March 21

meeting at the Fairfax Library
313 Vanderbilt St. - Fairfax

Cornell College Geology Students Field Work Review

Dr. Benjamin Greenstein (Professor of Geology and Associate Dean of the College at Cornell College) will bring several Cornell Geology Students to this meeting of the Cedar Valley Rocks and Minerals Society. They will provide their yearly review of how Society student scholarship grants have helped to assist in their educational field experiences and individual research projects. The geology department teaches field courses in the Bahama Islands and New Zealand and leads field trips to the St. Francois Mountains in Missouri, the Black Hills of South Dakota, Appalachian Mountains of Tennessee, as well as trips in Iowa, Wisconsin and Illinois.



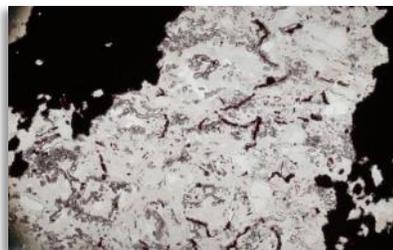
Dr. Ben Greenstein



Students studying coral reefs around the Bahama Islands.



The oldest fossil ever discovered on Earth shows that organisms were thriving 4.2 billion years ago, hundreds of millions of years earlier than previously thought. The microscopic bacteria, which were smaller than the width of a human hair, were found in rock formations in Quebec, Canada, but would have lived in hot vents in the 140°F oceans which covered the early planet. The discovery is the strongest evidence yet that similar organisms could also have evolved on Mars, which at the time still had oceans and an atmosphere and was being bombarded by comets, which probably brought the building blocks of life to Earth. Prior to this discovery, the oldest microfossils reported were found in Western Australia and dated at 3.4 billion years ago, leading scientists to speculate that life probably started around 3.7 billion years. But the new finding suggests life could have formed as early as 4.5 billion years, just one hundred million years after Earth formed. The tiny lifeforms were discovered in the Nuvvuagittuq Supracrustal Belt in Quebec, Canada, which contains some of the oldest sedimentary rocks in the world, dating back to 4.3 billion years ago, when the area was an iron-rich ocean. The organisms would have resembled small tubes, with a ball-like base which stuck to the ocean rocks, and a stalk suspended in the water to collect iron, on which they fed. They are similar to iron-oxidising bacteria found near other hydrothermal vents today.



Photomicrograph of a section of Nuvvuagittuq rock showing the ancient fossil bacteria.

Early Mars and early Earth were very similar places, so we may expect to find life on both planets at this time. Since life managed to get a foothold and evolve rapidly on Earth 4.2 billion years ago, we would expect both planets to develop early life.

<http://www.telegraph.co.uk/science/2017/03/01/oldest-fossil-ever-found-earth-shows-alien-life-mars-likely/>

CVRMS Board Meeting

Board Minutes – February 28, 2017

Called at 7:20 at the home of Marv & Sue Houg

Present: *President Marv Houg, Dale Stout, Ray Anderson, Bill Desmarais, Jay Vavra, Sharon Sonnleitner, Rick Austin*

Dale made a motion to approve the minutes of the January Board meeting as published. Seconded by Ray and carried.

SHOW: Sharon will get Ray's posters printed and get the advertising poster mounted on foam board for Geoland Show and Woodworkers Show. Marv noted we should have a booth at the Kirkwood STEM event next year to advertise our Show. Sharon prepared the press release and will send to the Gazette & Press Citizen and other area newspapers, such as Waterloo, Davenport, Dubuque, and Des Moines. Dale has gotten the insurance certificate to Hawkeye Downs. Marv announced Rich & Lisa Hagar will replace Roger Wolfe as a dealer, since we did not hear from Roger and could not contact him. Marv will order sand for the bone dig and paper for covering tables.

Displays: The following displays relate to our theme of Quartz & Calcite: Marv (Calcite); AJ Johnson (Agates); Dave Malm & Jeff Groff (Amethyst & Keswick); Ray (2 large calcite crystals and a geode from UI). We encourage exhibits of petrified wood, onyx figurines, shells, artifacts (quartz), flowstones, stalactites/Stalagmites, coprolite, and jaspers. Other displays welcome.

Misc: 200 egg carton collections were assembled by 8 m'bers on Feb 25. Setup will start at 8:30 at Hawkeye Downs on March 24. Dale will get plaster for making casts in the pebble pit area.

AFMS SCHOLARSHIP: A motion was made by Sharon to donate \$100 to the AFMS Scholarship fund. Seconded by Dale and carried. It was the consensus of the group that, in general, we would like to give scholarship money closer to home. We also decided to encourage donations to the MWF auction to support their endowment fund rather than direct contributions.

AUCTION: The following have asked for lots at the September auction: Zobacs – 100, Darren Cruse – 50, Bruce Birkemeyer – 50, Phil Oliver – 100, Sandy Brandl – 100, Wes Greenfield – 100, Larry Krohn – 150, Marv – 50, Jeff Vogel – 10, Doug DeRosear – 40, Clarence Burns for the Club – 30, Mike Blin?, Lynn Thayer?

MISC: Marv announced Echo Hills Elementary is looking for someone(s) from the club to present hands-on programs for their STEM night on April 21 from 5-7:30. Ray is delaying an attempt to get the crinoid named the State Fossil until next year. Regarding a fall bus trip, Bill will ask if people can go on a Saturday, which would work better for a trip to Chicago's Lizzadro Museum and Augustana. Another possibility is the Milwaukee Public Museum.

Dale made a motion to adjourn. Second by Jay. Adjourned at 9:40.

Respectfully submitted,
Sharon Sonnleitner, Acting Secretary

CVRMS Jan. 17 Meeting

Meeting held at Fairfax Library

Regular Meeting Minutes – February 21

Called at 7:05 at Fairfax Library by President Marv Houg

Scott Kleppe was introduced as a guest.

Sign-up Sheets were passed for: Safety training at the Mari-on Library on March 23 – cost \$10; Workers for the Show; Show Displays; Catered Dinner on Saturday at the Show.

Minutes from the last meeting: Julie Whitlatch made a motion to approve as published. Seconded by Sherri Mahlhouse and carried.

Treasurer Dale Stout reported a balance of \$27,291.40 in checking. Tom Whitlatch made a motion to accept the report. Seconded by Jay Vavra and carried.

We then broke for a program on "Iowa's Groundwater Basics" by Ray Anderson, followed by refreshments and social time. Tom Whitlatch won the door prize.

SHOW: Set-up will start at 8:30, Friday, March 24. Potluck dinner will be held that evening at 6:30. Dealers are our guests. Marv reminded members that we need material for door prizes, the pebble pit, and the silent auction. Ray announced the programs, including the program Saturday after the catered dinner for the dealers and club members: "25 Years of Devonian Fossil Gorge" by Dr. Ray Anderson. Bill Desmarais asked for samples of Quartz to use in his demonstration program. Tom will bring the trailer. Egg carton day is Saturday, February 25, at 1:00 at Sharon Sonnleitner's. Sharon will prepare show cards and raffle tickets.

SCIENCE FAIR: The Eastern Iowa Science & Engineering Fair will be held at Lindale Mall in Cedar Rapids on March 18, 2017. Bill Sonnleitner will judge. Bill Desmarais made a motion to donate \$200 to the event to be distributed as prizes of \$50 & \$30 for both the Senior and Junior divisions, with \$40 going to the Fair organization. Seconded by Ray and carried.

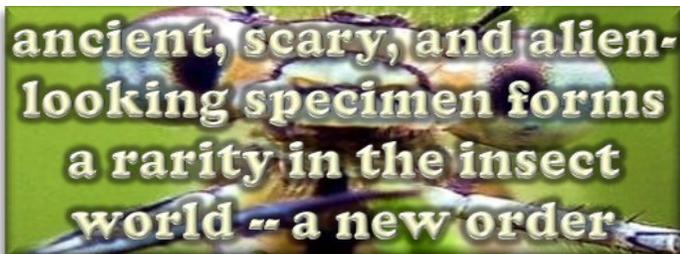
ANNOUNCEMENTS. Summer Picnics: June - Ellis Overlook, Lapidary Demos; July – Squaw Creek, Geode Cracking; August – Morgan Creek, Bingo. Marv will arrange Ellis. Dale will arrange the other two.

The Fort Dodge Show was announced.

OLD BUSINESS: Tom asked about making donations to the American Federation Scholarship Fund and MWF Endowment Fund. The item will be discussed at the next Board meeting and addressed at the next Regular meeting.

A.J. Johnson made a motion to adjourn. Seconded by Sherri and carried. Adjourned at 9:15

Respectfully submitted,
Sharon Sonnleitner, Acting Secretary



Researchers have discovered a 100-million-year-old insect preserved in amber with a triangular head, almost-alien and 'E.T.-like' appearance, and features so unusual that it has been placed in its own scientific 'order' -- **an incredibly rare event**. There are about 1 million described species of insects, and millions more still to be discovered, but every species of insect on Earth has been placed in only 31 existing orders. Now there's one more.



This strange insect found preserved in amber represents a new species, genus, family and order of insects

This animal is a small, wingless female insect that probably lived in fissures in the bark of trees, looking for mites, worms or fungi to feed on while dinosaurs lumbered nearby. It was tiny, but scary looking. It has a number of features that are different from other insect. Researchers said that they "*had never really seen anything like it. It appears to be unique in the insect world, and after considerable discussion we decided it had to take its place in a new order.*"

Perhaps its most unusual feature was a triangular head with bulging eyes, with the vertex of the right triangle located at the base of the

neck. This is different from any other known insect, and would have given this species the ability to see almost 180 degrees by turning its head sideways. The insect, probably an omnivore, also had a long, narrow, flat body, and long slender legs. It could have moved quickly, and literally seen behind itself. It also had glands on the neck that secreted a fluid that scientists believe most likely was a chemical to repel predators. The insect has been assigned to the newly created order **Aethiocarenodea**, and the species has been named **Aethiocarenius burmanicus**, in reference to the Hukawng Valley mines of Myanmar where it was found. Only one other specimen of this insect has been located, also preserved in Burmese amber. Those two specimens, which clearly belong to the same species, now comprise the totality of the order **Aethiocarenodea**. The largest order of insects, by comparison, is **Coleoptera**, the beetles, with hundreds of thousands of known species.

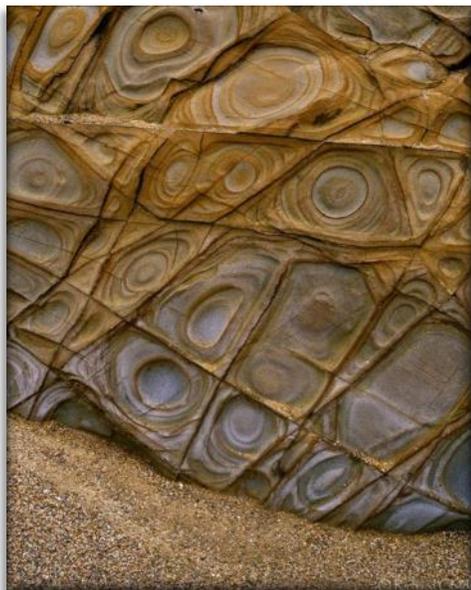
<https://www.sciencedaily.com/releases/2017/01/170125145747.htm>



Aquamarine, the blue variety of the mineral Beryl and birthstone of March, is a rich, medium to dark blue colored stone produced in Brazil, Madagascar, Russia, and the USA, and it has long been a symbol of youth, health and hope. Recently, aquamarine from China and Columbia has come on the market, but they are generally a little bit more yellow. Aquamarine is a highly sought-after semi precious gem, which for centuries has been used in the creation and encrustation of jewelry and everyday items. Sailors of legend believed that mermaids' tails were made of Aquamarine. The lucky stone was thought to ensure sailors a safe return. Aquamarine colors range from very light blue all the way through to a deeply saturated Ocean blue. The best color is often called Santa Maria Blue and recently there has been a new find in Madagascar called Double Blue. The name Aquamarine comes from the Latin words 'aqua' (Water) and 'marina' (Sea). Legend says that it is treasured by mermaids, and sailors would carry Aquamarine to protect them from drowning. Believed to aid in digestion, Roman physicians would employ Aquamarine to treat overeating and reduction of body fluid retention. It is believed that Aquamarine has the ability to reawaken the love in married couples. Roman legend also tells that it absorbs the atmosphere of young love; '*When blessed and worn, it joins in love, and does great things.*' It is also considered an appropriate gift for a Groom to give to his bride following the consummation of their marriage. To the Sumerians, Egyptians, and Hebrews, Aquamarine was the symbol of happiness and everlasting youth. Legend says that you should place your Aquamarine under a full moon, to help restore its look and renew its energy. The largest stone ever found is from Minas Gerais, Brazil; It weighed 242 pounds and measured 19 inches x 17 inches. The largest cut Aquamarine is the **Dom Pedro** which now sits in the Smithsonian Institute. It finished weighing in at 10,363 cts and measured 14 x 4 inches.

<https://www.gemrockauctions.com/learn/a-z-of-gemstones/aquamarine-information-the-blue-beryl>

What in the World?



What in the World is the unusual pattern in this rock exposure and how did it form??

February Photo



Last month's photo was a sphere of **orbicular granite**. Orbicular granite is an uncommon plutonic rock type which is usually granitic in composition. These rocks have a unique appearance due to *orbicules*, concentric shells of contrasted texture and mineralogy about a

central core compose orbicule structure, which is often characterized by radially and/or tangentially oriented minerals. concentrically layered, spheroidal structures, probably formed through nucleation around a grain in a cooling magma chamber. Most are known from Finland.

See page 6 for more information on orbicular granite.

Help!

We still need additional displays for the March 25-26 CVRMS Gem, Mineral, and Fossil Show. The show topic is "*Calcite and Quartz*," but we can use any display of rocks or fossils that visitors would enjoy viewing. We have a variety of display cases available if needed. If you have materials to display please contact Marv Houg at 364-2868 or m_houg@yahoo.com.

Rock Calendar 2017

CVRMS Events of Interest

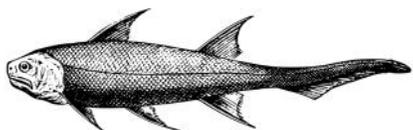
March 21 - CVRMS Monthly Meeting
Fairfax Library
313 Vanderbilt St. - Fairfax

March 25-26 - CVRMS Gem, Mineral, and Fossil Show

"Calcite and Quartz, Two of Earth's Most Versatile Minerals Abundant in Iowa"

Hawkeye Downs, Cedar Rapids

(see showflyer on page 9)



March 31-April 2—MAPS National Fossil Expo 39
"The Silurian"

Sharpless Auctions Facility, Iowa City

(see showflyer on page 11)

Sept. 16-17—CVRMS Rock Auction

Amana RV Park and Event Center

Amana, Iowa



Ask a Geologist

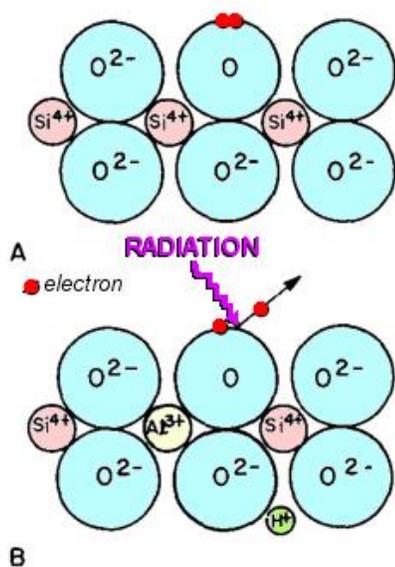
by Ray Anderson aka "Rock Doc", CVRMS Vice President

Ask a Geologist is a monthly column that gives CVRMS members an opportunity to learn more about a geologic topic. If you have a question that you would like addressed, please send it to rockdoc.anderson@gmail.com, and every month I will answer one in this column. Please let me know if you would like me to identify you with the question. I will also try to respond to all email requests with answers to your questions, regardless of if it is chosen.

Marv asked: "I've been meaning to ask you, what makes rose quartz pink??"

Rock Doc replied: I don't know, but I can find out. Quartz, like many minerals, occurs naturally in a variety of colors, and there are many causes for the color varieties. Rose Quartz ranges from very light pink to medium pink in intensity and is often milky or hazy, and it may lack good transparency. It turns out that scientists are not sure what causes the pink color. For many years microscopic inclusions of rutile (TiO_2) were thought to be the cause. Other proposals included the presence of irradiation induced color centers (the cause of colors in amethyst, citrine, and smoky quartz) in included minerals or in the quartz itself. **Color centers** are imperfections in crystals that cause color by absorption of light. They are most often due to radiation damage (exposure to gamma rays) because of the presence of radioactive elements (U, Th, K) in adjacent minerals. When the quartz is subjected to radiation, electrons are excited and removed from their normal sites, bounce around, loose energy, and eventually come to rest in a vacant site in the quartz (see figure below). Electrons in specific traps absorb only a certain range of wavelengths; the color that is seen

is the color **not** absorbed by these trapped electrons. The pink color disappears upon heating rose quartz (as it does with amethyst, citrine, and smoky quartz) but it takes temperatures above 500°C , much higher than the temperatures required to bleach other quartz colors. Heated rose quartz will not regain its color upon irradiation, but can produce smoky quartz. It is therefore unlikely that the color is caused by irradiation induced color centers. It was also suggested that fibrous inclusions of the mineral dumortierite ($\text{Al,Fe}_7[\text{O}_3 | \text{BO}_3 | (\text{SiO}_4)_3]$) are responsible for the haze and color of rose quartz (although dumortierite is usually deep blue, there are pink variants). More recently two scientists dissolved rose quartz from various locations in hydrofluoric acid and extracted mats of a fibrous, rose-colored mineral that is related, but apparently not identical to dumortierite. That mineral makes up only about 0.05% - 0.15% of the overall weight of rose quartz. Like rose quartz, the mineral bleached when heated above 500°C and did not regain its color when irradiated. However, heat treatment in a reducing atmosphere did turn heated and paled material rose-colored again. So there you go Marv, rose quartz gets its color from minute inclusions of an unknown borosilicate—MAYBE. There is also a rare, different variety of quartz called pink quartz, first discovered in the 1930's in Maine then "re-discovered" in Minas Gerais, Brazil. Its pink color is thought to be caused by trace amounts of phosphate or aluminium.



Smoky Quartz Structure: (A) normal, (B) containing Al^{3+} substituted for Si^{4+} with an H^+ for charge neutrality. Radiation ejects one of a pair of electrons from an O^{2-} and leaves a "hole" color.

HEY, CVRMS MEMBERS !
Make sure you pick up your
new Club directory from
Sharon at the Rock Show.



Rose
Quartz

More About Orbicular Granite

Orbicular textures in rocks have been described at more than one hundred localities worldwide. Orbicules are found in igneous, metamorphic, and migmatitic terrains and are not restricted to unusual or limited compositions. Concentric shells of contrasted texture and mineralogy about a central core compose orbicule structure, which is often characterized by radially and/or tangentially oriented minerals. Hypotheses of orbicule genesis



include both magmatic and metamorphic origins for these rocks; however, no single hypothesis provides a comprehensive explanation. Orbicules have been compared with other natural and artificial rhythmically layered structures (such as Liesegang rings and layered igneous rocks). Spacing of orbicule shells reflects stability of the formational environment. Some orbicule shells result from exchange of material between core and matrix. Conditions that cause rhythmic layering in igneous rocks may result in orbicule formation if crystallization is localized about scattered centers. Cores of such orbicules serve as crystallization centers and need not have specific or limited compositions.

No correlation has been demonstrated between orbicule structure, chemical composition, or gross geologic setting. The Orbicular granite in these pictures is from the Boogardie Quarry located 22 mi west of Mount Magnet in Western Australia. The orbicular granite is hosted by a pink, medium-grained, late Archean (2,686 my) granitic rock, comprising myrmekitic biotite granodiorite that becomes tonalitic in places. Information from diamond drillholes indicates that orbicular granite bodies may have formed as saucer-shaped, sill-like structures within the host granodiorite-tonalite. Over the area of the Boogardie quarry, the orbicular granite appears as an oval-shaped body, about 130 ft wide and at least 180 ft long. Maximum thickness at the center is 37 ft, tapering off in all directions to relatively small thicknesses at the outer rims. Within the sill-like structures, abundant granitic orbicules are contained in a leucogranitic body of variable tonalitic composition. The black and white, concentrically banded orbicules are of spectacular appearance. Orbicules are mostly ellipsoidal but also include lesser numbers of near-spherical, irregular and broken shapes. Orbicules have an average length of about 5.5 inches along their longest axis by 3 inches in width. Orbicule spacing varies from orbicular masses in tangential contact with one another to a maximum separation of about 4 inches, although overall orbicule distribution appears roughly uniform throughout the rock. Individual orbicules are generally separated from the enclosing granitic matrix by a mid- to dark grey outer shell up to 1/3 inch thick, which is made of mainly fine- to medium-grained hornblende, biotite and plagioclase feldspar, with minor opaque oxide and titanite. Inside this protective shell, orbicules have a hornblende diorite composition, largely composed of plagioclase feldspar and hornblende with lesser amounts of biotite, opaque oxide and titanite. Orbicules usually contain five to seven (or even more) major, well-defined concentric zones of variable width, structural complexity and mineralogy. Some major zones may be up to 15 mm wide and commonly contain large, irregular, elongate, radially aligned hornblende grains interspersed with white plagioclase.

<http://www.nationalrockgarden.org.au/rock-collection-2/rock-listing/show/11>

Giant Meteorite Found

Last year workers in Argentina excavated an enormous meteorite that hit our planet thousands of years ago. At six feet wide and 33 tons and named after the near-by town of *Gancedo*, it is the second largest fragment of the **Campo del Cielo** meteorite and is one of the biggest meteorites to survive impact with Earth! In 1576, the gover-

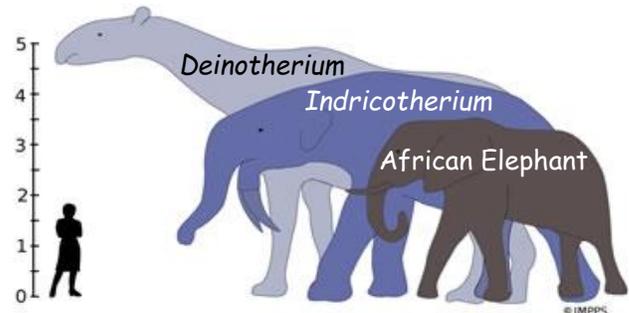


nor of a province in Northern Argentina commissioned the military to search for a huge mass of iron that Natives said had fallen from the sky in a place they called *Campo del Cielo* ("Field of Heaven"). The expedition found a large mass of metal protruding out of the soil, and assuming it was a natural iron deposit brought back a few samples, which were described as being of unusual purity. A second expedition, launched in 1783, rediscovered the iron mass and excavated around it, determining it was a single stone and collecting samples which were sent to the Royal Society of London. Those samples were later analyzed and found to contain 90% iron and 10% nickel and assigned to a meteoritic origin. Eventually a crater field of at least 26 craters was found in the area, the largest being 350×300 feet. The field covered an area of 2×12 mi., with an associated strewn area of smaller meteorites extending farther by about 37 mi. The size of the main body is estimated as larger than 15 feet and weighed over 60 tons. Samples of charred wood collected beneath meteorite fragments were analyzed for carbon-14 composition, yielding a date for the fall of 4,200–4,700 years ago (2,200–2,700 years BC). [Click here to view a video of the recovery of the *Gancedo* meteorite.](#)

<http://boredomtherapy.com/argentinas-massive-meteorite/>

Largest Land Mammals Ever

Research, funded by a National Science Foundation grant and led by a University of New Mexico Biology Professor, brought together an international team of paleontologists, evolutionary biologists and macroecologists to revisit key questions about size, specifically in mammals. Mammals grew from a maximum of about 10 kilograms when they were sharing the earth with dinosaurs to a maximum of 17 tons afterwards. The researchers found that the pattern was surprisingly consistent, not only globally but also across time and across trophic groups and lineages (animals with differing diets and descended from different ancestors). The maximum size of mammals began to increase sharply about 65 million



The largest land mammals that ever lived, *Indricotherium* and *Deinotherium*, would have towered over the living African Elephant. *Indricotherium* lived during the Eocene to the Oligocene Epoch (37 to 23 million years ago) and reached a mass of 15,000 kg, while *Deinotherium* was around from the late-Miocene until the early Pleistocene (8.5 to 2.7 million years ago) and weighed as much as 19 tons.

years ago, peaking in the Oligocene Epoch (about 34 million years ago) in Eurasia, and again in the Miocene Epoch (about 10 million years ago) in Eurasia and Africa. The largest mammal that ever walked the earth - *Indricotherium transouralicum*, a hornless rhinoceros-like herbivore that weighed approximately 17 tons and stood about 18 feet high at the shoulder - lived in Eurasia almost 34 million years ago.

"The remarkable similarity in the evolution of maximum size on the different continents suggests that there were similar ecological roles to be filled by giant mammals across the globe," said Professor Felisa Smith, project leader. "This strongly implies that mammals were responding to the same ecological constraints."

<http://geology.com/press-release/largest-land-mammals/>

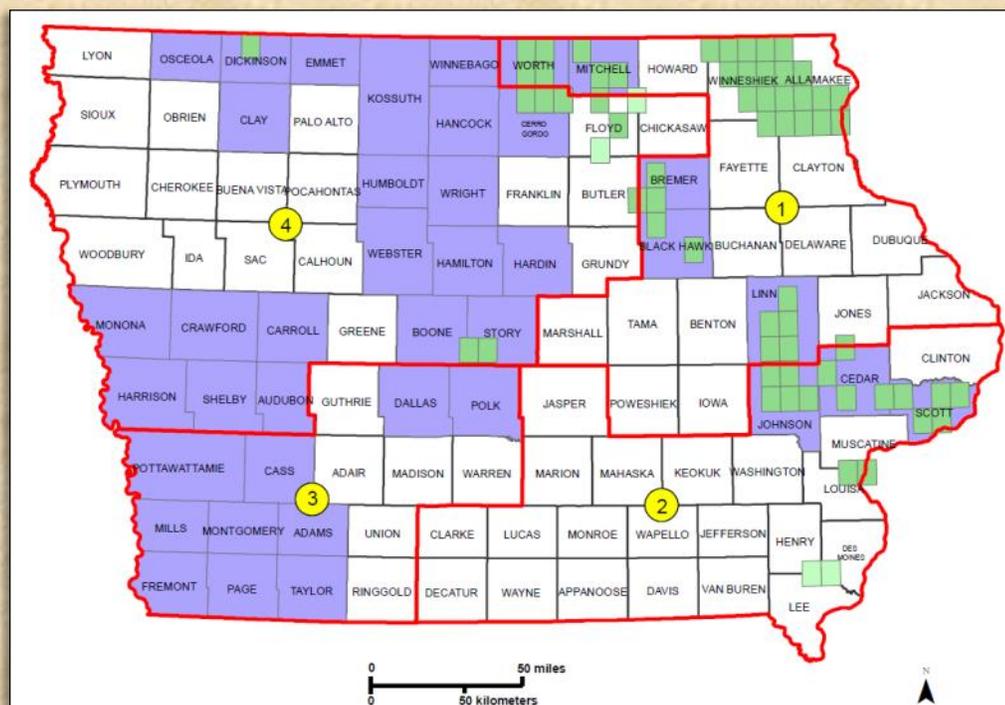
What's New In Iowa Geology ??

Editor's Note: In this is a new section of Cedar Valley Gems I will try to keep Society members up to date on a few of the new discoveries in the world of Iowa Geology.

Modern Digital Geologic Mapping in Iowa

Since 1993 the Iowa Geological Survey (IGS) has been participating in the Statemap cooperative geological mapping program with the U.S. Geological Survey (USGS) to produce a series of digital geologic maps of the state (see location map below). These include maps of the surficial and bedrock geology, and digital copies can be down-

loaded from the IGS website (URL below) and printed to any scale. Most are georeferenced and can be used with GIS programs. The mapping is done by IGS geologists using all available data including previous geologic mapping, digital soils maps and data, well drill data (with selected new well logging), extensive field mapping with limited test drilling. Financial assistance from the USGS assisted with salaries and limited test drilling and sample analysis. Download digital copies of these Statemap maps at [https://www.ihr.uiowa.edu/igs/publications/publications?category=Open-File-Maps-\(digital-maps\)](https://www.ihr.uiowa.edu/igs/publications/publications?category=Open-File-Maps-(digital-maps))

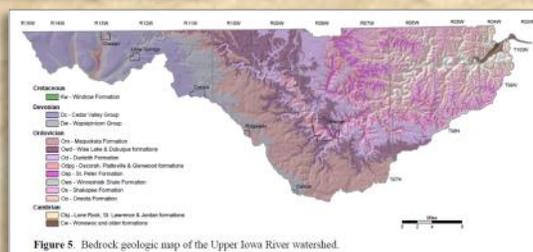
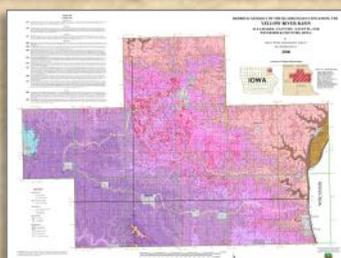
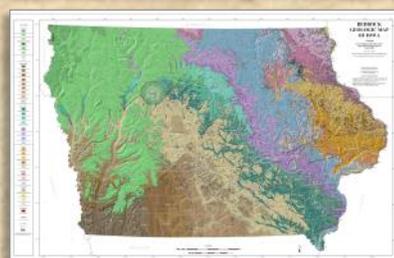


STATEMAP Funding (FY1993 through FY2016)

- ① Congressional District Numbers
- ▭ Congressional District Boundaries
- ▭ Completed 1:24,000 scale geologic maps
- ▭ In-progress 1:24,000 scale geologic maps
- ▭ Completed 1:100,000 scale geologic maps
- ▭ In progress 1:100,000 scale geologic maps
- ▭ Completed statewide regional bedrock geologic maps

<http://www.ihr.uiowa.edu/igs/files/2014/04/iowa-Fact-Sheet-2015.pdf>

digital maps showing the bedrock geology of Iowa, the Yellow River Basin, and the Upper Iowa River Basin



Cedar Valley Rocks & Minerals Society
Presents its

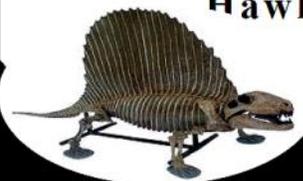
2017 GEM, MINERAL & FOSSIL SHOW

Iowa's Largest & Among Midwest's Largest

53rd
Annual
Show

Saturday March 25 - 8:30 a.m. to 6:00 p.m.
Sunday, March 26 - 9:30 a.m. to 5:00 p.m.

Hawkeye Downs Expo Center
4400 6th Street SW
Cedar Rapids, Iowa



CALCITE & QUARTZ

Two of Earth's Most Versatile Minerals
Abundant in Iowa

Also Featuring Dimetrodon, courtesy of Ray Garton

PROGRAMS

Programs on
Theme-Related Topics
Call ahead or check our
web site for Speakers & Times.

DEMONSTRATIONS

Tumbling
Glass Bead Making
Cabbing, Beading
Silversmithing
Flint Knapping
Geode Cracking

PEBBLE PIT FOR KIDS

1¢, 5¢, 10¢, 25¢, & 50¢ Items
\$1 Rock & Mineral Kits

HOT FOOD

Hawkeye Downs Concessions

**PROFITS GO TO
SCHOLARSHIPS**

**NOT RESPONSIBLE
FOR ACCIDENTS**



SLUICE FOR MINERALS

MANY ITEMS FOR SALE, INCLUDING:

Books	Fossils	Jewelry	Minerals	Book Ends
Opal	Agates	Carvings	Seashells	Petrified Wood
Slabs	Geodes	Crystals	Tumblers	Lapidary Equip.
Gems	Beads	Spheres	Meteorites	Jewelry Findings

For Additional Information, Contact:

Marvin Houg (319-364-2868, m_houg@yahoo.com);

Sharon Sonnleitner (319-396-4016, sonnba@aol.com); Tom Whittlatch (319-362-0684, whitlatcht@gmail.com)

For program, dealer, and show updates, check: www.cedarvalleyrockclub.org

DISPLAYS

Agates
Minerals
Crystals
Fossils
Amethyst
Petrified Wood
Polished Stones
Artifacts
Spheres, Geodes

SILENT AUCTION

Geodes, Minerals, Crystals, etc.

DONATIONS REQUESTED

Adults\$3.00
Students\$1.00
(12-18)
ChildrenFree
(Under 12)
Youth GroupsFree
(w/adult)

**CHILDREN MUST BE
ACCOMPANIED BY AN ADULT
ONLY SERVICE DOGS
ALLOWED**

Mammals almost wiped out with the dinosaurs

A new study concludes that over 90 percent of mammal species were wiped out by the same asteroid that killed the dinosaurs in the Cretaceous period 66 million years ago, significantly more than previously thought. A study by researchers at the Milner Centre for Evolution at the University of Bath reviewed all mammal species known from the end of the Cretaceous period in North America. Their results showed that over 93 per cent became extinct across the Cretaceous-Paleogene (K-Pg) boundary, but that they also recovered far more quickly than previously thought. The scientists analyzed the published fossil record from western North America from two million years before the Cretaceous-Paleogene boundary, until 300,000 years after the asteroid hit. They compared species diversity before and after this extinction event to estimate the severity of the event and how quickly the mammals recovered. The extinction rates were much higher than previous estimates based on more limited data sets. Dr. Nick Longrich explained: *"The species that are most vulnerable to extinction are the rare ones, and because they are rare, their fossils are less likely to be found. The species that tend to survive are more common, so we tend to find them. The fossil record is biased in favor of the species that survived. As bad as things looked before, including more data shows the extinction was more severe than previously believed."* Following the asteroid hit, most of the plants and animals died, so the survivors probably fed on insects who were eating dead plants and animals. With so little food, only small species survived. The biggest animals to survive on land would have been no larger than a cat. The fact that most mammals were small helps explain why they were able to survive. Yet the researchers found that mammals also recovered more rapidly than previously thought, not only gaining back the lost diversity in species quickly but soon doubling the number of species found before the extinction. The recovery took just 300,000 years, a short time in evolutionary terms. Because mammals did so well after the extinction, we have tended to assume that it didn't hit them as hard. However this analysis shows that the mammals were hit harder than most groups of animals, such as lizards, turtles, crocodilians, but they proved to be far more adaptable in the aftermath. Surprisingly, the recovery from the extinction took place differently in different parts of the continent. For example, the species found in Montana were distinct from those in nearby Wyoming. *"You might expect to see the same few survivors all across the continent, but that's not what we found,"* said Longrich. *"After this extinction event, there was an explosion of diversity, and it was driven by having different evolutionary experiments going on simultaneously in different locations."* <https://www.sciencedaily.com/releases/2016/06/160620084935.htm>

The Mammal-like Reptile that Survived



Artist's reconstruction of a *tritylodontid*.

The "mammal-like reptiles" are an excellent example of a transitional sequence in the evolution of mammals from their ancestors; however, they are now called **synapsids**, because they were not reptiles. They were the ancestor of both mammals and rep-

tiles which evolved in parallel. Primitive **synapsids** are usually called **pelycosaurs**, and more advanced mammal-like ones called **therapsids**. They included herbivores and carnivores, ranging from small animals the size of a rat to bulky herbivores a ton or more in weight. Now totally extinct, they dominated the terrestrial fauna from the late Pennsylvania, throughout the Permian. Although they were all but wiped out by the Permian-Triassic mass extinction about 250 mya, some survived into the Jurassic period. The mammals arose from advanced **synapsids** in the Upper Triassic, at which time the dinosaur reptiles were rapidly replacing the mammal-like reptiles as the principal terrestrial forms. While excavating a geologic layer from the Cretaceous era in Kuwajima, Japan, researchers found fossils of dinosaurs, turtles, lizards, fish, many types of plants, and Mesozoic mammals. Among these were more than 250 *tritylodontid* teeth, the first to be found in Japan. They were identified as a new species. This finding suggests that *tritylodontids* co-existed with some of the earliest mammal species for millions of years, overturning beliefs that mammals wiped out mammal-like reptiles soon after they emerged. *Tritylodontids* lived in the Jurassic era and proliferated worldwide, but were thought to have died out as herbivorous mammals took over their ecological role in the late Jurassic. This made sense, because otherwise *tritylodontids* and the herbivorous mammals would have competed for the same niche. This raises new questions about how *tritylodontids* and their mammalian neighbors shared or separated ecological roles in the Late Cretaceous environment.

<https://www.sciencedaily.com/releases/2016/04/160425112655.htm>



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